Photograph: P. Black

northcoast eyebright

Euphrasia collina subsp. *tetragona*

TASMANIAN THREATENED FLORA LISTING STATEMENT

Scientific name: ***Euphrasia collina*** **subsp.** ***tetragona*** (R.Br.) W.R.Barker, *J. Adelaide Bot. Gard.* 5: 189 (1982)

Family: Scrophulariaceae

Common Name: northcoast eyebright (Wapstra *et al.* 2005)

Status: *Threatened Species Protection Act 1995*: **endangered**

Environment Protection and Biodiversity Conservation Act 1999: **Not listed**

Distribution: Tasmanian NRM Regions: **Cradle Coast**

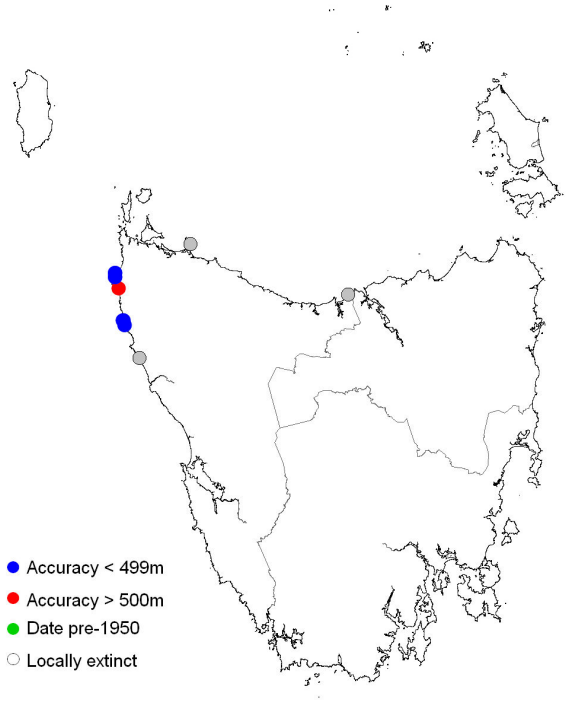

Figure 1. Distribution of *Euphrasia collina* subsp. *tetragona* in Tasmania.

Plate 1. *Euphrasia collina* subsp. *tetragona* (Photograph: Micah Visoiu)

IDENTIFICATION AND ECOLOGY

Euphrasia collina subsp. *tetragona* is a short-lived perennial herb in the Scrophulariaceae family. It has erect flowering stems to 50 cm high, with 'spikes' of striking purple, pink or white flowers at their ends (Plate 1). Peak flowering occurs from November to December. Flowers are required for identification and surveys are best conducted during peak flowering, as plants are difficult to detect when not in flower.

Euphrasia collina subsp. *tetragona* is known from near-coastal habitats in northwestern Tasmania. *Euphrasia* species require open patches of ground to ensure germination and hence the above-ground persistence of populations (Potts 1997, 2000). Population size is also determined by moisture availability, as new seedlings require a relatively high level to survive. The species is semi-parasitic, and high moisture levels are required until it parasitises hosts through root attachments.

Insects are the most likely pollination vector for this species (A. Hingston, pers. comm.).

Description

The taxon referred to here as *Euphrasia collina* subsp. *tetragona* is a broader definition of the one described by Barker (1982), and encompasses Barker's *Euphrasia collina* subsp. 'Northwest Tasmania'. The latter is endemic to Tasmania, and is characterised by its shorter branches and smaller leaves, flowers and capsules, while it may also have short non-glandular hairs on the external surface of its lower corolla lobes, whereas *Euphrasia collina* subsp. *tetragona* is hairless.

The following description is adapted from Barker (1982). Cited dimensions are for *Euphrasia collina* subsp. 'Northwest Tasmania', with dimensions for *Euphrasia collina* subsp. *tetragona* in the strict sense shown in brackets.

Euphrasia collina subsp. *tetragona* is a short-lived perennial herb with a longevity in the order of 3 to 5 years. The stems are erect and much branched. In flower the plant is up to 15 (50) cm tall.

Leaves. The leaves are arranged in opposite pairs at right angles to one another (decussate). They are crowded on the vegetative branches and also the lower parts of the flowering branches. The leaves are variable in size, being 5 to 7.5 (14) mm long and 2.2 to 4.5 (6) mm wide for leaves immediately below the first open flower. The upper surfaces of the leaves are generally hairless, though sometimes they have scattered non-glandular hairs. The leaves are semi-succulent with toothed margins and have either a very short stalk or are stalkless.

Flowers. The flowers are arranged in dense racemes at the ends of the branches, with flowers opening successively along the stem. Floral bracts, leaf-like structures associated with the flowers, are similar to the foliage leaves. The corolla is 6.5 to 9 (9 to 17) mm long and hooded, the upper lip being smaller than the widely spreading three-lobed lower lip (Plate 1). The corolla can be white, pink or purple and may sometimes have a yellow spot on its lower lobe. The stamens have red-brown coloured anthers, each with a short projection (awn) into the throat of the flower.

Fruit. The fruit is a capsule, slightly flattened and oblong in outline, 4.5 to 7 (7.5 to 12) mm long.

Confusing Species

Euphrasia collina subsp. *tetragona* s.str. can be distinguished from the other subspecies of *Euphrasia collina* without glandular hairs on upper leaves and bracts as it branches above ground level, it has an elongated apical bud cluster above the first open flowers and lacks hairs on the external surface of the lower corolla lobe. The smaller extant variant (*Euphrasia collina* subsp. 'Northwest Tasmania') can sometimes have non-glandular hairs on the external surface of the lower corolla lobe and branching at ground level. Further assessment of fresh material is required to clarify taxonomic status and relationships.

DISTRIBUTION AND HABITAT

Euphrasia collina subsp. *tetragona* is currently restricted to the State's northwest, occurring in near coastal regions between West Point and Ingram Bay (Figure 1). The extant populations

have a linear range of 39 km, extent of occurrence about 25 km^2, and an area of occupancy of less than 0.5 ha.

Euphrasia collina subsp. *tetragona* in the strict sense is also known from Victoria, South Australia and Western Australia. It was collected in Tasmania by Ronald Gunn in 1836 and 1837 in the Circular Head and Woolnorth areas (Barker 1982) though the taxon is presumed extinct at these locations. All other records from Tasmania are from the smaller form of the subspecies (*Euphrasia collina* subsp. 'Northwest Tasmania'). They include historic collections from near Badger Head and the Lagoon River area (Barker 1982, Tasmanian Herbarium collection details).

In Tasmania, *Euphrasia collina* subsp. *tetragona* has been recorded from two distinct habitats in recent years:

1. near-coastal calcareous dunes within grasslands dominated by short *Poa rodwayi* with associated plants including *Brachyscome diversifolia* var. *diversifolia*, *Craspedia* sp. and *Ajuga australis* (Schahinger 2002, Plate 2); and
2. sandy pockets within outcrops of Precambrian quartzites that support open heaths, with *Leptospermum glaucescens*, *Aotus ericoides*, *Banksia marginata*, *Bossiaea cinerea*, *Hibbertia* species, *Leptospermum scoparium*, *Lomandra longifolia* and *Lepidosperma concavum* and, at the West Point Road site, scattered low *Eucalyptus nitida*.

Recently recorded sites are within 3 km of the coast, at altitudes of up to 70 m above sea level.

POPULATION ESTIMATE

Euphrasia collina subsp. *tetragona* is known from four extant subpopulations (Table 1). Plant numbers at individual sites have been observed to fluctuate considerably from year to year in response to poorly known climatic variables, making an estimate of the total population size problematic. Based on site data collected by the Threatened Species Section (TSS) since 1999, a conservative upper estimate is 600 mature plants (Schahinger 2005 and TSS data).

There has been considerable survey effort on the West Coast in recent years, particularly as the area is rich in threatened orchids. However further survey is warranted, as occurrences can be small and cryptic, and areas with rocky outcrops away from roads have not been well targeted.

Plate 2. Grassland habitat of *Euphrasia collina* subsp. *tetragona* at Possum Banks (Photograph: M. Larcombe)

RESERVATION STATUS

Three of the four extant *Euphrasia collina* subsp. *tetragona* populations occur within the Arthur-Pieman Conservation Area.

CONSERVATION ASSESSMENT

Euphrasia collina subsp. *tetragona* s.str. was listed as rare on the Tasmanian *Threatened Species Protection Act 1995* in 1995. The broad concept of *Euphrasia collina* subsp. *tetragona* was listed as **endangered** on the TSP Act in August 2003. It qualifies under criterion B:

The extent of occurrence is less than 500 km^2 and area of occupancy less than 10 ha, and

B1 it is known to exist at no more than five locations and

B2 there is a continuing decline (associated with a past and projected inappropriate disturbance regime).

Table 1. Population summary for *Euphrasia collina* subsp. *tetragona* in Tasmania.

	Location	Tenure	1:25000 mapsheet	NRM region	Year (first) last recorded	Number of mature plants	Area occupied (ha)
1	West Point Road	Arthur Pieman Conservation Area	Marrawah 3046	Cradle Coast	(2006) 2007	80–90 136	– 0.04
2	Eagle Rock * (Mawson Bay)	Private	Marrawah 3046	Cradle Coast	(2001) 2002	10 50–60	0.005 0.1
3	Marrawah Road (c. 1 km from Arthur River) *	Private?	Bluff 3045	Cradle Coast	(1970) 1970	Status uncertain	?
4	Possum Banks	Arthur Pieman Conservation Area	Temma 3043	Cradle Coast	(1999) 2000 2001 2002 2004 2006 2007	'100s' c. 400 0 400 130–150 105 18	– 0.17 – 0.17 0.05 – 0.04
5	Ingram Bay	Arthur Pieman Conservation Area	Ordnance 3042	Cradle Coast	(2001) 2002 2004	0 15–20 2	– 0.03 0.5 m apart
6	Mouth of Lagoon River *	Arthur Pieman Conservation Area	Johnsons Bay 3140	Cradle Coast	(1954) 1954	Presumed extinct	–
7	Near Badger Head *	?	?	Cradle Coast	(1850) 1850	Presumed extinct	–
8	Circular Head (& possibly Woolnorth) **	?	?	Cradle Coast	(1836-1837) 1836-1837	Presumed extinct	–
9	Sand hills on Northwest Coast *	?	?	Cradle Coast	(1800s) 1800s	Presumed extinct	–

* Determined to be *Euphrasia collina* subsp. 'Northwest Tasmania' (Barker 1982 and HO collections);

** Determined to be *Euphrasia collina* subsp. *tetragona* s.str. (Barker 1982).

THREATS AND LIMITING FACTORS

Lack of disturbance. *Euphrasia collina* subsp. *tetragona*, like other *Euphrasia* species, is dependent upon some form of disturbance to maintain openings for the germination of its seed and hence its persistence at a particular site.

For those populations associated with near-coastal grasslands, Possum Banks and Ingram Bay, exposure to salt-laden winds and occasional drought events would appear to be sufficient to inhibit woody shrub invasion by woody shrubs such as *Hibbertia sericea*, *Beyeria lechenaultii* var. *latifolia*, *Banksia marginata*, *Leucopogon parviflorus* and *Acacia longifolia* subsp. *sophorae*, whilst also maintaining opportunities for germination (Plate 2). The grassland populations are, however, sensitive to climatic vagaries, as demonstrated by the fluctuations in plant numbers at the Possum Banks site (Table 1).

The open heath sites at West Point Road and Eagle Rock, would appear to be less sensitive to climate, as evidenced by the persistence of the species at Eagle Rock in 2001 (while being absent from the two grassland sites). Regular fire may be required to maintain openings for the species at these sites. The West Point Road site was last burnt in December 2003, and the nearby Eagle Rock site in April 1995. The area has a history of frequent fires due to arson, and

the risk of an extended period without fire would appear to be low.

Areas within the Arthur-Pieman Conservation Area are subject to a fire management plan (Parks & Wildlife Service 2003). The native grasslands at Possum Banks and Ingram Bay had been earmarked for burning during the plan's 2002–2012 period, but they have since been excluded as the sensitivity of the sites to exposure and drought has been recognised (Schahinger 2002 & 2005).

Expanding sand blows. The population at Possum Banks is at risk in the short to medium term of being smothered as a result of expanding sand blows initiated by cattle and/or off-road vehicles. The large-scale movement of mobile sand is believed to have led to the demise of the Lagoon River population (R. Schahinger, pers. comm.).

Land clearance. The Eagle Rock population is on private land and is notionally at risk from land clearance, though this is considered an unlikely scenario given the rocky nature of the site.

Phytophthora cinnamomi. The non-host specific semi-parasitic nature of the species makes it indirectly susceptible to the exotic soil-borne plant pathogen *Phytophthora cinnamomi*. This is considered a risk for plants growing in habitat with a high proportion of susceptible species, such as the heath communities at Eagle Rock and West Point Road.

Climate change. The recruitment requirements of the species make it susceptible to any changes to the rainfall pattern caused by the effects of climate change. This may be especially pertinent for the two grassland populations, as demonstrated by the decline in numbers since 2002.

Stochastic events: The small size of the populations exposes the species to a stochastic risk of extinction.

MANAGEMENT STRATEGY

Euphrasia collina subsp. *tetragona* is included in the revised 'Recovery Plan for Threatened Tasmanian Lowland *Euphrasia* Species' (Threatened Species Section 2008). The main objectives of this Plan include the following:

1. Secure the protection of existing populations from potentially detrimental changes in land use or disturbance patterns.
2. Increase the number of populations of threatened taxa by survey, verification of records and identification.
3. Recover declining populations by management of habitat and translocation.
4. Develop mechanisms to manage populations in the long term.

The main actions involve the identification of occurrences including taxonomic work to ensure that taxa can be correctly identified and effectively managed. Protection and recovery will also involve further investigation of the species' ecology and the possible use of fire as a management tool.

What has been done?

- Extension surveys have been undertaken for the species between Woolnorth and the Pieman River during the period 2001–2006 (Schahinger 2002, 2005, 2007).
- Management issues at the Possum Banks and Ingram Bay sites have been identified (Schahinger 2002, 2005, 2007).
- Seed from the West Point Road and Possum Banks populations was collected in early December 2006 for long-term storage as part of the Millennium Seedbank (SeedSafe) Conservation Project.
- Monitoring of the Possum Banks site was initiated in 2007 as part of the NRM-funded Threatened Orchids and Euphrasia project, with the tagging of individual plants.

What is needed?

The following actions are proposed for the recovery of *Euphrasia collina* subsp. *tetragona*.

- Clarification of the taxonomic status of *Euphrasia collina* subsp. *tetragona* in Tasmania. Reassessment of the taxon's conservation status will be required should the nomenclatural status of the taxon be revised.

- Protection of populations from future changes in land use and encouragement of landowners or land managers to manage populations. Support the Private Land Conservation Program (DPIW) with the establishment of Conservation Covenants for private land supporting the species, and ensure that current priorities for the species are incorporated into the program's reservation strategies.
- Fencing of the Possum Banks site to prevent disturbance by off-road vehicles and/or cattle, and rehabilitation of sand blows that threaten the population (Schahinger 2002, 2005, 2007).
- Fencing of the Ingram Bay site to prevent disturbance by off-road vehicles and/or cattle (Schahinger 2002, 2005, 2007).
- Collection of seed from the Eagle Rock and Ingram Bay populations.
- Extension surveys particularly in open heath habitat in the West Point Road to Eagle Rock area.
- Monitoring of priority occurrences to better understand population dynamics and disturbance requirements.
- Establishment of a mechanism to ensure management intervention as and when required.
- Provision of information and extension support to relevant Natural Resource Management Committees, Local Councils, Government Agencies and the local community on the locality, significance and management of known populations and potential habitat.

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View:
http://www.dpiw.tas.gov.au/threatenedspecieslists

Contact details: Threatened Species Section, Department of Primary Industries & Water, GPO Box 44, Hobart, Tasmania, Australia, 7001. Phone (03) 6233 6556; fax (03) 6233 3477.

Permit: It is an offence to collect, disturb, damage or destroy this species unless under permit.